Archaeological
Institute of
America

THE MAUSOLEUM AT HALICARNASSUS

[PLATES V–VII]

II. THE ARCHITECTURAL DESIGN

FOR the purpose of attempting a new restoration of the Mausoleum, I determined in a previous article[1] the probable dimensions and proportions of the Ionic order there employed, as affected by the tendencies of the period and by the position of the spectator. It was this order which decided the exact dimensions of the structure. What Pythius conceived as the design of the whole tomb will appear if we trace the previous development of the sepulchral monument in this region.

In Asia Minor we find, with regard to the disposal of the dead, three tendencies arising independently in as many provinces. First, there was the development from the primitive custom of marking the grave by a small heap of earth or stone, — the tumulus, found in great numbers throughout Lydia and Caria. In this form the burial chamber is within a pile of earth surrounded by a retaining wall of stone, like the tumulus of Alyattes,[2] or within a pyramid of coursed masonry, as in Egypt. Second, the chamber was hewn in the face of the cliff, decorated at first like the façade of a house, as in Phrygia and Lycia,[3] and finally cut more and more in the open until in Lycia the house form stands entirely free. Third, the chamber was set on the top of a high basis, and was a free-standing monolith, hollowed at the top and covered by a flat monolithic ceiling; this was the favorite form at Xanthus, as in the case of the Harpy Tomb, and many examples have been noted elsewhere.[4]

[1] *A.J.A.* XII, 1908, pp. 3–29.

[2] Perrot and Chipiez, *Histoire de l'Art*, V, pp. 266–273.

[3] *Ibid.* pp. 81–145. [4] Benndorf and Niemann, *Kleinasien*, I, p. 107.

These separate tendencies soon met and were combined in various ways. The most important was the superposition of the tumulus on the high basis, as at Cnidus, where stepped conical structures surmount plain square basements.[1] Meanwhile a new influence came in from Ionia, the highly developed forms of Greek columnar architecture, which were copied even on the façades of Phrygian rock-cut tombs. At Xanthus, where the tomb chamber on a high basis was a favorite type, an innovation was introduced early in the fourth century; the tomb chamber was surrounded by a peristyle, becoming the naos of a complete Ionic temple which has pediments and all the accompanying features; such was the Nereid Monument at Xanthus.[2] Thence the idea travelled to Cnidus, where the peripteros was inserted between the high basis and the stepped tumulus; the first example is the Lion Tomb,[3] erected perhaps by the Athenians to commemorate the defeat of the Lacedaemonians by Conon off Cnidus in 394 B.C. Three separate elements, the pyramidal tumulus, the tomb chamber surrounded by a peristyle, and the high basement, due to Lydia, Ionia, and Lycia respectively, are here united and crowned by a pedestal with a colossal reclining lion.

What we know of Carian sepulchral architecture is extremely limited. Investigations by Newton[4] and Paton[5] show that the favorite form was a tumulus raised about a rectangular chamber, which was lined with stone sometimes laid in courses and sometimes irregular, the four walls leaning inward until they could be roofed by a single slab. These corbelled vaults were either semicircular or pointed in section; in the latter case the corbelling was done mainly in the side walls, the end walls being more nearly vertical, as if terminating a barrel vault. Such tombs are found on the sites of the villages of the Leleges, most of which were depopulated by Mausolus when he remodelled Halicarnassus. One, at Labranda, is even supposed by Newton to have been the tomb of Hecatomnus, father of Mausolus.[6]

[1] Newton, *Hist. of Discoveries*, II, pp. 501–502.
[2] Falkener, *Mus. Class. Antiq.* I, 1851, pp. 256–284.
[3] Newton, *l.c.* I, pl. 62–66; II, pp. 480–511.
[4] Newton, *l.c.* II, pp. 580–588.
[5] *J.H.S.* VIII, 1887, pp. 64–82; XVI, 1896, pp. 242–271.
[6] Newton, *l.c.* I, pl. 77; II, pp. 618–619.

When Artemisia gave to Pythius and Satyrus the commission to design the monument at Halicarnassus, the form which it should logically assume had already become fixed, in its main features at least. Four parts were to be combined: (1) the high basement, (2) the peripteros, (3) the pyramid, and (4) the sculptured group surmounting the pyramid. As for the construction, we should expect to find the pyramid, the successor of the tumulus, supported above the tomb chamber by a corbelled vault exactly like that in the native Carian tumulus.

All four elements were in some manner, we know, combined in the Mausoleum. That there was a lofty basement we can surmise, not only from the style of preceding monuments, but from gaps in Pliny's description, which imply the existence of a basement, though it is not expressly mentioned. That there was a peripteros we are explicitly told by Pliny, and this is also proved by the fragments of bases, shafts, and capitals of columns, of the entablature, and of beams from the ceiling of the pteroma, found by Newton in the excavations of 1857. That there was a stepped pyramid we know also from Pliny, and about fifty steps belonging to this pyramid were found during the excavations. Finally, Pliny mentions the sculptured group, the quadriga, which surmounted the whole; and most of this group was actually found lying where it had fallen, hurled sixty feet from its original position, perhaps by some earthquake of the fourteenth century.

In the centre of the semicircular shore of the harbor of Halicarnassus, and halfway up the slope of the hills which enclosed it like a theatre,[1] was an ancient quarry, the best possible site for the Mausoleum. Aside from the natural advantages of its commanding position, the great hollow which had been excavated for the purposes of the quarry needed only slight enlargement to serve as a foundation cutting ready for use, while the numerous galleries through the friable rock could be transformed into drains. This was done; a rectangle was laid out; where it extended beyond the quarry excavation the rock was cut away, while the irregular hollow, where it lay beyond the

[1] Cf. Vitruvius, II, 8, 11.

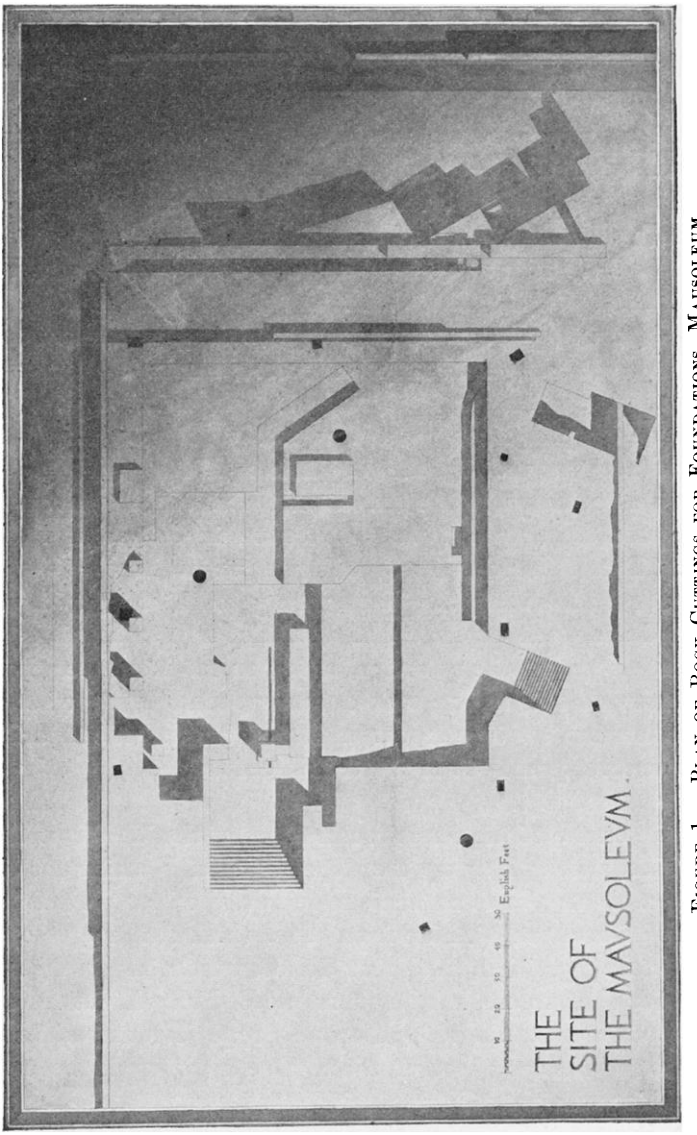


FIGURE 1. — PLAN OF ROCK CUTTINGS FOR FOUNDATIONS, MAUSOLEUM.

desired rectangle, was filled in with sand compacted by masonry piers (Fig. 1).[1]

The dimensions of this foundation cutting were necessarily made somewhat greater than those of the base of the sepulchre; yet they may throw some light on the design. Newton's reports give the dimensions of the rock cutting as 126 or 127 feet by 110, 108, or 107 feet; those most generally accepted, 108 × 127 feet, result in a perimeter of 470 feet. We may, for verification, compare this result with what we know from ancient writers, three of whom give the length of the perimeter. Hyginus (*Fab.* 223) gives *circuitus pedes CIↃCCCXXXX;* Pliny (XXXVI, 30) says *toto circumitu pedes CCCCXXXX* (or *CCCCXI*); and Vibius Sequester (*de Septem Spectaculis*) makes it *in circuitu pedum CCCC.* These conflicting statements, 1340, 440, 411, and 400 feet, may be traced back to one original source, 440 Roman or Greek (= 426.86 English) feet,[2] which is about what we should expect for a structure to be built within a 470-foot excavation.

We have now an idea of the general *size* of the intended monument; its perimeter (426.86 ft.) far exceeded the 111 feet of the Nereid Monument or the 129 feet of the Lion Tomb, the structures nearest in point of similarity. The *proportions* of the rectangle thus enclosed are revealed by the few remaining steps of the pyramid which crowned the whole. Ever since the excavations of 1857 these steps have served as the basis for

[1] Constructed from the plan and sections, Newton, *l.c.* I, pls. 3 and 5.

[2] First, *Fab.* 223 of the *Codex Frisingensis* (of Hyginus ?) and the list of the seven wonders appended to the *Codex Jacobi Revii* of Vibius Sequester are almost identical, in the choice of the wonders, the order in which they are enumerated, and the words with which they are described (though they show conscious attempts at originality); yet the discrepancies show that they were not copied one from the other, but rather from a common original which is missing. They may, for our purpose, be regarded as two copies of a single author (Hyginus ?). Now the *Cod. Fris.* has *CIↃCCCXXXX*; but the *Cod. Rev.*, while unfortunately it omits the *XXXX*, shows that the *CIↃCCC* of the other was originally *CCCC*; the reading in both should be, then, *CCCCXXXX.* Second, all but one of the manuscripts of Pliny have *CCCCXI*; the exception, the *Codex Bambergensis*, has *CCCCXXXX.* This last, however, is the best authority, and as long ago as 1836 Sillig (ed. Pliny, V, p. 443) decided that Pliny must have written *CCCCXXXX*, and that some copyist, in attempting to write *CCCCXL*, omitted the bar of the *L*, with *CCCCXI* as a result. All the evidence thus points toward *CCCCXXXX* as the true perimeter.

restorations; they were constructed (Fig. 4) in such a careful system of interlocking ridges, grooves, and angles that if we had all the stones they could be fitted together in their original order and the whole pyramid reconstructed; therefore the pyramid has been regarded as the key to the problem.

These steps have the exposed parts, the treads and risers, carefully smoothed and polished; the concealed parts, however, are rough-tooled, and the setting lines are clearly marked. Thus we are enabled to measure the exposed treads, and immediately find two series, a narrower and a wider; that these were used on adjacent faces of the pyramid appears from angle stones showing a wide tread on one face and a narrow tread on the return. The width of the narrow treads is variously given, as 17 inches exactly,[1] or as 1.42 feet = 17.04 inches.[2] The tread, however, is not the only horizontal measurement to be considered, for, on account of exposure to the weather, the risers were sloped inward. Now in a step the important horizontal dimension is the distance that one can advance with each rise, *i.e.* the distance from the foot of one riser to the foot of the next, regardless of what happens between these points. Therefore the horizontal projection of the slope, given as 0.3 of an inch, must be included; if it were not, and the steps had been calculated with a certain unit for the tread proper, there would have been a slight interval between each unit and the next, affecting the whole plan. The horizontal dimension of the step is, then, according to Pullan, 17.04 + 0.30 = 17.34 inches, almost exactly the Greek cubit (17.46 in.). And measurements with a Greek scale from steps in the British Museum (Nos. 987–988) give 23½ dactyls for the tread alone, and 24 dactyls, including the sloping riser, in the case of the narrow steps. Similarly I obtained for the wider steps 29⅜ dactyls for the tread only, 30 dactyls for the whole.[3]

It is evident that the narrow steps were laid out as one cubit, or 24 dactyls; and the wider, in the ratio of 5:4, as 30 dactyls. Thus the steps on adjacent sides of the pyramid formed slopes

[1] Newton, *Hist. of Discoveries*, II, p. 163. [2] *Ibid.* I, pl. 25.

[3] The authorities give 1.75 ft. = 21″ (Newton, *Hist. of Discoveries*, I, pl. 25), 21.5′ (*Brit. Mus. Cat.* II, p. 86), and between 21.2″ and 21.3″ (Fergusson, *Mausoleum*, p. 21).

at different angles to the horizontal plane. These slopes intersect in lines which appear in plan in an unusual relation to the sides of the rectangle formed by the base of the pyramid. In such a peculiar disposition there must have been regularity and reason, for we cannot believe that Pythius would have allowed the intersections of the slopes to fall at random.

If the pyramid had been square, the steps would naturally have returned around the corners on diagonals at 45° in plan. This pyramid was, however, not square but oblong, as shown by Pliny's statement that the front and back were shorter than the other two sides (*brevius a frontibus*), and by the dimensions of the foundation cutting. In such a case there were two

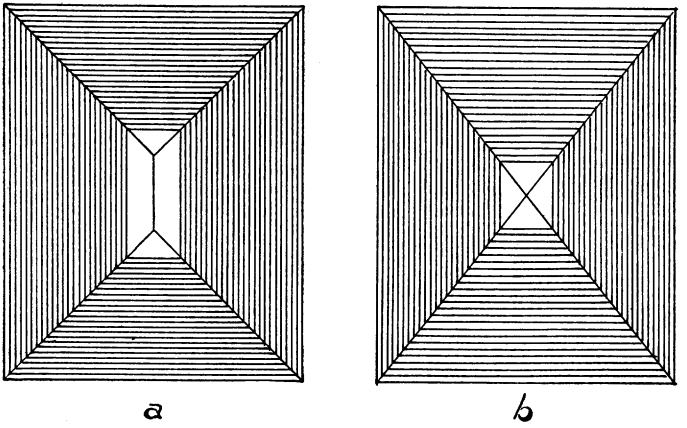


FIGURE 2. — ALTERNATIVE PLANS FOR THE PYRAMID.

logical courses: (1) to return the steps around the corners on 45° lines, giving similar slopes on all sides, but making the platform at the top too long and narrow for the quadriga (Fig. 2, *a*); or (2) to return the steps on the diagonals of the rectangle, giving a single ratio for all the parts thus formed, and leaving a platform of reasonable shape at the top, but causing the slopes to be unequal (Fig. 2, *b*). The latter must have been the case in the Mausoleum, where the slopes are known to have been unequal.[1] The widths of the steps, in the ratio

[1] So in the Lion Tomb, where the pyramid is *square* at the base, in order to form at the top an *oblong* platform for the reclining lion, the slopes were also

of 4:5, show that they were derived from large dimensions also in the ratio of 4:5, *i.e.* the front and side of the platform of the quadriga and the base of the pyramid itself. It would have been impossible for a Greek architect, with his inherent love of proportion, to follow any other course. We may safely accept the fact that the dimensions of the base of the pyramid were in the ratio of 4:5; therefore, if one dimension could be obtained, the whole would be known.

By means of this ratio, and the intercolumniation which I have shown to be $10\frac{1}{2}$ Greek feet, the plan of the peristyle can be determined. Pliny says that the structure was surrounded by thirty-six columns, and there seems to be no reason for doubting this statement. Among the thirty-six were counted the angle columns; that these were columns and not piers is shown by the fact that of the three capitals discovered one has the characteristic angle volute.[1] Thus there were thirty-six intercolumniations; $36 \times 10\frac{1}{2} = 378$ Greek feet, the perimeter of the rectangle through the centres of the columns. The wide spread of the pyramid steps shows that, to surround such a rectangle, the thirty-six columns must have been arranged in a single row, not in two rows (a dipteros) as some restorers have suggested. As for the number of columns on each face, literature gives us no information. We know, from the foundation cutting and from Pliny, that the east and west faces were shorter than the others. Arrangements which naturally suggest themselves are 8×12 columns and 9×11 columns, a total of 36 in each case. The former appears to modern investigators as the more desirable, for our ideas of Greek columnar design are almost limited to temples, where an axial entrance was usually necessary. But a rectangle of 8×12 columns has proportions which utterly disagree with those of the pyramid (as determined above) and of the foundation cutting; while the other disposition, of 9×11 columns, gives a rectangle of 8×10 intercolumniations, a proportion of 4:5, exactly as laid out for the pyramid. Furthermore, we must remember that in the Mausoleum it was impossible to enter through the

made unequal, the steps on adjacent sides having treads of 10 and $14\frac{3}{4}$ inches respectively (Newton, *Hist. of Discoveries*, I, pl. 64).

[1] *A.J.A.* XII, 1908, p. 14.

peristyle, which formed a second story; and that when the Greeks did not intend that a colonnade should be entered from the outside, they were careful to place a column in the centre, as on the flanks of temples; and that there are several temples which have an odd number of columns even on the fronts, as at Pompeii, Thermon, Locri, Paestum, and Agrigentum.

Within the peristyle was something which we may call the *naos*. This is clear from the fact that Pliny says *cingitur columnis XXXVI;* something was necessary inside for the support of the pyramid, and that this was a definite structure, not a forest of piers, seems evident from Pliny's manner of referring to it, and the dimensions which he assigns, *sexagenos ternos pedes, brevius a frontibus;* this, since its total perimeter must be less than 252 Greek feet ($4 \times 63 = 252$), can have nothing to do with the peristyle. We may safely, then, assume solid walls, forming a *naos* or *cella*. The length given to it by Pliny is equivalent to six intercolumniations, out of a total which we have seen was ten; the total width of the peristyle was eight intercolumniations, of which the naos must have had but four (to be less than the six on the sides). The only alternative would be to make the naos 8×6 intercolumniations, as Adler[1] has done; this forms a very massive structure, completely filling the pteron, as seen in perspective. Apart from the fact that it completely disregards Pliny, we have against it Martial's words, *aëre nec vacuo pendentia Mausolea.*[2] These can refer, as Oldfield says,[3] only to the openness of the colonnades; they cannot mean that it was actually hanging, nor that it was especially high in itself, nor that it had a very lofty situation. But the openness of the colonnades cannot refer to any widening of the intercolumniations beyond the normal $10\frac{1}{2}$ Greek feet, nor to a dipteral arrangement of the columns, nor to a breaking up of the naos walls into a group of piers. It must mean that the distance between the columns and the naos wall was great. From all this evidence we see that the Mausoleum was pseudo-dipteral, with a pteroma of the width of two

[1] F. Adler, *Das Mausoleum zu Halikarnass*, Berlin, 1900.
[2] Martial, *Spectacula*, 1.
[3] E. Oldfield, *Archaeologia*, LIV, 1895, pp. 278–279.

intercolumniations all around the naos. The actual dimensions of the naos would seem to have been $66\frac{3}{4} \times 45\frac{3}{4}$ Greek feet, making the antae equal to the lower diameter of the columns, as at Priene and Teos (PLATE VI).

Against this it may be urged that Vitruvius (III, 3, 8–9) definitely states that the pseudo-dipteros was invented by Hermogenes, who flourished at a later date. But this may be disputed. The so-called basilica at Paestum, the Greek temple at Pompeii, and Temple G (or T) at Selinus, all of the sixth century, were pseudo-dipteral, as was the Olympieum at Agrigentum.[1] As an Ionic example we have the temple at Messa, dating from about 400 B.C.; the unsupported length of the beams of its pteroma was 16 feet.[2] Thus the architects of the Mausoleum had precedents for such an arrangement. In this case the clear span of the ceiling beams would be 17 Greek feet, equal to 16.49 English feet, hardly greater than at Messa. It was well within the limit set by that greatest of all Greek spans, the lintel over the central intercolumniation of the east front at Ephesus, 28 feet $8\frac{1}{2}$ inches long, the clear span being about 24 Greek feet; and this epistyle carried frieze, cornice, and pediment.[3] The pyramid must have been so arranged with corbelled vaults as to throw the weight entirely on the peristyle and the naos wall, leaving the ceiling beams to support only themselves and the covering slabs.

We may here notice the construction of the ceiling of the pteroma. The few remaining stones show that the system was one with large coffers corresponding closely to the columnar arrangement, as at Priene, instead of the very small coffers, often spaced at random, that were customary in Greece proper. The anta being $3\frac{3}{4}$ feet across, the thickness of the naos wall may be assumed as slightly less,—$3\frac{1}{2}$ Greek feet at least. The

[1] In these the ceiling of the pteroma was of wood.

[2] The story of the "invention" at Magnesia seems due to the fact that Hermogenes, as Vitruvius says, removed the inner colonnade of the old dipteral temple. Its foundations still exist between those for the outer colonnade and those for the naos wall. This fact, however, scarcely justifies the statement, *Hermogenes primus invenit rationem.*

[3] Compare the similar lintel in the older temple with an even greater clear span. Of the famous epistyle (Pliny, *H.N.* XXXVI, 95) no fragments were found in the recent English excavations (*A.J.A.* X, 1906, p. 100).

inner face of the epistyle of the order has a single fascia with a moulding, the two together being 16 dactyls high; the same feature must have been carried along the top of the naos wall, as in all Ionic peristyles. Above this, beams were laid across the pteroma, from points just over the columns to the naos wall. Part of one of these beams was found; it is one cubit high, divided into two fascias and a rebate for a crowning moulding; the width of the soffit is 2 Greek feet, with a plain sinking in the centre as in the case of the epistyle. To receive the outer end of each beam, the inner side of the lower stone of

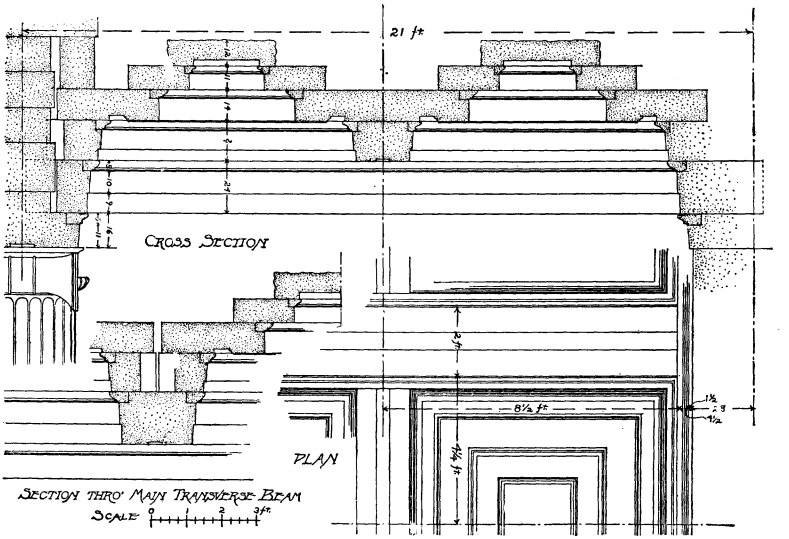


FIGURE 3. — THE CEILING OF THE PTEROMA.

the epistyle, just at the joint above the column, was cut as a pocket about 36 dactyls wide, and extending 24 dactyls into the epistyle; the upper course of the epistyle, which was also jointed over the column (so that both acted as lintels), was cut to fit around the cross-beam. The inner end of this beam was embedded in the naos wall; its fascias and mouldings were returned along the naos wall and the inner side of the epistyle. The pteroma ceiling was now divided into oblong panels, $8\frac{1}{2} \times 17$ feet, one to each intercolumniation (Fig. 3).

Since the cross-beam is one cubit high, its top comes just

8 dactyls below the top of the epistyle. Now the back of the upper stone of the epistyle, which was not exposed, is for the most part perfectly plain; one piece has, however, near the joint above the column, a rebate about 8 dactyls in height. Here, and here only, therefore, something rested both on the cross-beam and on the epistyle; it must have been not a continuous course but a beam running along the top of the cross-beam and forming a superposed lintel, just as in the epistyle of the order. This superposed beam was returned across the centre of the great panel, dividing it into two compartments, each almost square, corresponding to its length of two intercolumniations. The overhang of this secondary beam reduced the width of the panel to 7 feet 4 dactyls.

The lacunaria were formed each by two corbelled courses, reducing the size of the compartments until they could be covered by single flat slabs. A block from the lower of these courses, forming a complete side of a coffer, is preserved; it is mitred at 45° at both ends, giving measurements of 4 feet 6 dactyls for the inside (4.285 ft. Eng.), and exactly 7 feet 4 dactyls (6.905 ft. Eng.) for the outside, so that it fits the distance between the cross-beams. Its height is 14 dactyls, with a rebate for a cyma; the soffit has a sunk panel, the inner edge decorated with a cyma. A second fragment gives the height of the upper corbel course as 11 dactyls, with a single fascia and a rebate for a moulding. Possibly some remains of the covering slabs exist in several fragments of reliefs sunk in simple frames (Brit. Mus. Nos. 1038–1041), though this is uncertain; there are no setting lines, as there should be, for covers of coffers; yet the slabs are irregular on the back and all four sides, and the width of the frame varies on the different sides, so that they could not have been built into a wall. No dimension is preserved, but the scale of the human figures gives the length of the panel as about 37 dactyls, which fits the upper corbel course.

Above the entablature of the order rose the pyramid. Concerning this part of the structure Pliny says: *Namque supra pteron pyramis altitudine inferiorem aequat, viginti quattuor gradibus in metae cacumen se contrahens. In summo est quadriga*

marmorea quam fecit Pythis. Haec adiecta, CXXXX pedum altitudine totum opus includit. The data which we have already found determine that the slopes on adjacent sides were different, the treads being 24 and 30 dactyls respectively; so, with twenty-four steps, *i.e.* twenty-three treads, the north and south slopes were $34\frac{1}{2}$ Greek feet each, and those on the east and west $43\frac{1}{8}$ Greek feet.

The text of Pliny reads *pyramis altitudine inferiorem aequat*, *i.e.* the pyramid equals the lower . . . in height. The noun to be supplied, and with which *inferiorem* agrees, would in that case naturally be *pyramidem.* Then we should have it that the pyramid above the pteron had a height equal to that of the lower pyramid. Where was this lower pyramid? Some have found evidence in the mention by Claude Guichard,[1] based on the description of an eye-witness, De la Tourrette, of *certaines marches de marbre blanc, qui s'esleuoyent en forme de perron emmy d'un champ pres du port, là où iadis estoit la grande place d'Halycarnasse*, and also in his words, *que de tant plus qu'on creusoit profond, d'autant plus s'eslargissoit par le bas la fabrique.* This cannot have been the pyramid above the order, which had been carried off by the Knights of Rhodes in 1404, for the construction of the castle of Petronium, as Fontanus tells us;[2] and Guichard mentions no columns below it. Moreover, earth could not have accumulated to the height of the upper pyramid. Guichard must, then, refer to steps belonging to the part of the structure below the columns. But such lower steps could by no means have formed a pyramid, because (1) such a pyramid would be truncated so near its base that it would not have appeared pyramidal to Mucianus (Pliny); (2) no such lower pyramid is found either in the structures from which the Mausoleum is derived or in those derived from the Mausoleum, but merely a few steps carried around the base; (3) the foundation cutting, which, to have a close bonding of the masonry, must have contained the whole structure, allows no space for a lower pyramid, for its dimensions are 108×127 feet, of which 85.13×105.49 feet were occupied by the columns alone, leaving only 10.75 to 11.44 feet

[1] Guichard, *Funerailles, etc., des Rommains, Grecs, etc.*, Lyons, 1581, p. 380.
[2] Fontanus, *De Bello Rhodio*, Rome, 1524, Lib. II, fol. xi.

all around for the projection of the column bases, the steps of the stereobate and those of the basement. Therefore the only pyramid was that above the columns, and Sillig was right in amending to *pyramis altitudinem inferiorem aequat;* probably in the manuscripts it was at first *altitudinem*, then *altitudinē*, and finally *altitudine*, with the stroke which indicated the final *m* lost.

It being understood that the pyramid equalled the lower height, the question now is what lower height Pliny intended. Though several conflicting opinions have been proposed, that he was thinking of the basement, or of the peristyle, or of the basement and peristyle together, there is but one obvious answer. Pliny has mentioned but one lower height, that of the pteron. When he says that above the pteron (peristyle) was a pyramid which equalled the lower height, he cannot mean that the pyramid equalled the basement, to which no reference has been made, and about which his readers are not supposed to know; as for the pteron and basement together, that supposition is shown by the remains to be absolutely impossible. Therefore the pyramid equalled the pteron, *i.e.* the order of columns, in height.

The order, as we have seen, was 42 Greek feet high ; hence the pyramid was likewise 42 Greek feet high. Again we have no reason for doubting Pliny's statement; this is not a dimension given as a round number, but a proportion, and such a proportion was very likely. It remains to show how far the existing remains of the pyramid substantiate this.

The only remains of the pyramid are about fifty steps, with a height given by Pullan as 0.97 of a foot (= 11.64 inches); my measurement is 16 dactyls (= 11.64 inches). There were twenty-four steps, so that the height of the pyramid proper could be only 24 Greek feet; this leaves 18 Greek feet unaccounted for. It may seem tempting to occupy this by the quadriga, as in the restorations of Smith and Pullan. But Pliny, after noticing that the pyramid equalled the height of the pteron, says that on its top was the quadriga, and that *after* this had been added, the total height was raised to 140 feet. The quadriga was not included in the 42 feet, and the extra height must have been filled by other methods.

Pliny compares the pyramid with the meta of the Roman circus. Roman reliefs show that the meta was a tall cone, set on a circular pedestal, and truncated at the very top for a pine cone. There was nothing to resemble this in the flat slopes of the Mausoleum pyramid. But there must have been something more than the steps. If the slope had started directly from the cornice of the order, the pyramid would have been invisible from within 120 feet of the Mausoleum, and the quadriga would have appeared to stand in the centre of a flat horizon, the top of the sima. Some say that the purpose of the pyramid was merely to raise the quadriga until it could be seen; but the pyramid itself was an important part of the design, as is shown in the earlier monuments from which it is derived, and it must have been visible as well as the quadriga. The design needed a podium below the pyramid and a pedestal to raise the quadriga above the truncated top of the pyramid. Evidence as to these features is offered by the Lion Tomb at Cnidus, the only predecessor of the Mausoleum that includes all the elements; this has, above the entablature, a plain podium without mouldings, from which rise ten steps in the form of a truncated pyramid, crowned by a high pedestal with the reclining lion. Such a form also accords better with Pliny's reference to the meta. Just how the 18 feet are to be divided between the podium and pedestal cannot be stated; the proportions of the design are in favor of a podium about $7\frac{1}{2}$ feet high and a pedestal (for the quadriga) of $10\frac{1}{2}$ feet (PLATE V).

The exact dimensions of the base of the pyramid are uncertain. The sima of the order forms a rectangle 95 feet 3 dactyls by 116 feet 3 dactyls. On the upper face of a preserved sima block is a weather mark; its distance from the nosing of the sima is given by Pullan as 1.88 English feet, exactly 31 dactyls. So the dimensions of this course above the sima would seem to form a rectangle 91 feet 5 dactyls by 112 feet 5 dactyls, unless the setting line varied on end and side. This line was probably the trace of a step below the plinth of the podium; the face of the podium, and therefore the lowest step of the pyramid proper, must have been set somewhat farther in. I have assumed that the podium formed a rectangle about 86 feet 8 dactyls by 108 feet 2 dactyls, in the proportion of 4:5.

The pyramid was designed, like the roof of a temple, with the joints of the blocks protected by ridges; the only possible way to do this in heavy blocks of stone, without overhanging edges which would break off, was to cut half of a ridge on each block, so that the joint was not actually covered (as in the case of roof tiles), but formed merely a watershed, throwing off rain to either side. The ridges ran to the back of the stone, where

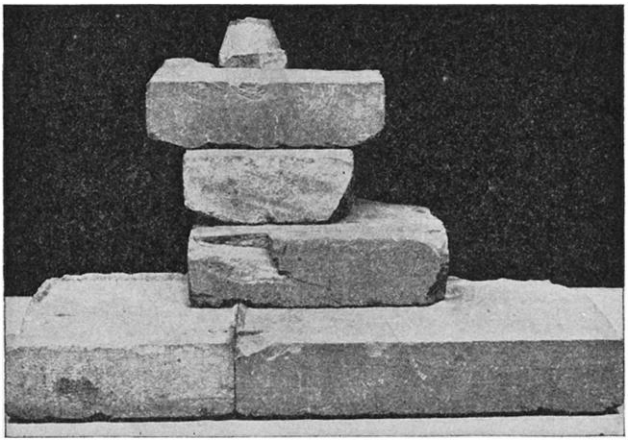


FIGURE 4. — STEPS FROM THE PYRAMID.[1]

corresponding grooves in the lower sides of the stones above fitted them; and a wider ridge at right angles to those of the joints, along the rear edge of the upper face of each stone, was likewise received in a groove in the superposed course, forming an interlocking system as a safeguard against earthquakes (Fig. 4).

These watersheds being so prominent, we should expect, on the analogy of the tile roof, that they had some relation to the lion-head water-spouts to which they led. Now for the actual lengths of the stones my only data are the examples drawn by Pullan.[2] Here two ordinary stones, from different sides of the pyramid, have lengths given as 3.90 feet and 3.42 feet English;

[1] The topmost stone is part of the plinth under the quadriga, and, with the horse's hoof inserted in it, has no relation to the steps with which it is thus grouped in the British Museum.

[2] Newton, *Hist. of Discoveries*, I, pl. 25.

the angle stone is, on the exposed risers, 5.00 feet × 2.82 feet. Now 3.42 feet are $56\frac{1}{3}$, or more likely 56, dactyls, which is exactly the spacing of the lion heads. And a fragmentary stone, while now only 2.94 feet long, measures from the preserved joint to the centre of the groove on the lower face exactly half the length of the 3.42 foot step. The ordinary steps, therefore, were 56 dactyls long, and broke joints in the centres of those below. The angle blocks necessarily had different measurements for each course, on account of the lack of agreement between the 24 and 30 dactyl treads, and the 56 dactyl joint spacing.

We may call the dimensions of the base of the pyramid 86 feet 8 dactyls by 108 feet 2 dactyls. Subtracting the slopes of the sides, the platform at the top becomes a rectangle $17\frac{1}{2} \times 21\frac{7}{8}$ feet. On this must have been placed the pedestal of the quadriga, $10\frac{1}{2}$ Greek feet high, and, by its mouldings and sloping sides, reducing the size of the plinth actually occupied by the quadriga to $14 \times 18\frac{3}{8}$ Greek feet.

Of the chariot group enough was found to allow certain restoration. The wheels were 7 feet 7 inches in diameter, exactly 7 feet 13 dactyls Greek. The lower half, 3 feet $14\frac{1}{2}$ dactyls, was separate from the upper half, and evidently was in one piece with a support under the floor of the car. In the chariot stood two figures,[1] representing Mausolus and Artemisia, the former 10 feet 3 dactyls high ($9' 10\frac{5}{8}''$) and the latter 9 Greek feet ($8' 9''$). The height of the group, including the lower half of the wheel, the floor, and the figure of Mausolus, was about $14\frac{1}{2}$ Greek feet, apparently intended as a third of the pyramid of 42 feet, or of the order.

The only possible method of constructing the pyramid was by the use of the ordinary Carian corbelled "vault." I have imagined it as somewhat in the form of a pointed barrel vault running from front to back of the naos, springing from the lateral walls and interior columns; the haunches are weighted

[1] There is some doubt with regard to the position of these figures. Arguments in favor of an empty chariot have been put forward by Prof. P. Gardner (*J.H.S.* XIII, 1893, pp. 188–194); these have been met by Mr. Oldfield (*Archaeologia*, LV, 1897, pp. 365–373), whose proof that the figures stood in the chariot seems conclusive.

down by heavy walls above the naos walls, and are abutted by the smaller "vaults" above the pteroma ceiling; these in turn are held in place by masonry behind the cornice and attic.[1] The pedestal of the quadriga is lightened as in the Cnidian tomb, consisting merely of four walls and covering slabs; even the latter are hollowed on the lower faces.

The basement is that portion of the structure not mentioned by Pliny. Yet it must have been present, as shown by the monuments which Pythius used as models. And of Pliny's height for the whole structure, 140 Greek feet, including the quadriga, we have so far accounted for only $98\frac{1}{2}$ feet, including the pteron, pyramid, and quadriga. Subtracting from Pliny's total, the remainder is $41\frac{1}{2}$ feet, which must have belonged to the part below the pteron. But as the height of the pteron was 42 feet, and that of the pyramid likewise 42 feet, it is more than probable that the part below the pteron formed a third division of 42 feet, so that the exact height of the whole structure would have been $140\frac{1}{2}$ Greek feet; 140 feet, however, sufficed as a round number, especially since the height of the quadriga could not be accurately calculated by Mucianus or his guide.

Other statements of the height are given by Hyginus and Vibius Sequester, both differing from Pliny; Hyginus has *LXXX* feet, and Vibius Sequester *CLXXX*. These figures cannot be reconciled with Pliny's, as were those relating to the perimeter. We have therefore no alternative but to accept Pliny's statement as *CXXXX*, and that of Hyginus as *LXXX*, especially since the latter is confirmed by Vibius Sequester with his *CLXXX* (drawn from the same source, but with the *C* added from a desire to exaggerate). The two heights must

[1] The centre of gravity of the entablature fell 18 dactyls outside the axis of the columns and was not brought back to the inside line of the columns, the limit for stability, until the attic and the backing of the entablature had been added, and the corbelling made three feet in thickness. The very slight tendency toward an outward thrust was counteracted by using the ceiling beam as a tie. It was fastened at each end by several clamps laid in the direction of the stress, as is shown by the fragment in the British Museum. The friction resulting from the mass of masonry above aided in maintaining the stability. The "vaulting" above the naos must have been similarly arranged. See the sections in PLATE VII.

have referred to different elevations, and it is natural to regard 140 feet as the total height, and 80 feet as the distance from the ground to the cornice of the order. This is confirmed by what we have found as the height of the cornice above the ground, *i.e.* 84 feet. It is plain that 80, like 140, is a round number, and that for accuracy the figures should be given as 84 feet and $140\frac{1}{2}$ feet respectively.

The 42 feet below the pteron must have been occupied by the high basement, an important element in all the predecessors of the Mausoleum, and likewise in the tombs derived from it. But no architectural fragments belonging to the basement exist *in situ*.[1] We can, however, infer so many facts about it that its approximate restoration is not a matter of difficulty. The dimensions of a rectangle drawn through the centres of the columns are 84×105 Greek feet; the dimensions of the peristyle from outside to outside of the colonnade, 87 feet 12 dactyls by 108 feet 12 dactyls; and the dimensions of the stylobate, allowing for the projection of the bases and that of the stylobate beyond them, 89 feet 8 dactyls by 110 feet 8 dactyls, a perimeter of 400 feet. The peristyle was probably raised on two steps; as the lower step we may take a stone in the British Museum (No. 989) with a narrow tread (6 dactyls, including the inclination of the riser) and a high rise (32 dactyls), so that the bases of the columns might not be hidden from view; the perimeter is thus enlarged to 403 Greek feet. Below was the basement proper, crowned by a geison, under which was probably one of the sculptured friezes, preferably the Centauromachia, which is of coarser stone and has weathered more than the Chariot frieze. The dimensions of the basement were probably about $94\frac{1}{2} \times 115\frac{1}{2}$ Greek feet, thus enlarging the perimeter to 420 feet. Below this was a sort of socle, such as appears in many of the tombs of the type of the Mausoleum, and, as in them, its masonry may have been rusticated. For this socle, the dimensions $99\frac{1}{2} \times 120\frac{1}{2}$ Greek feet (perimeter 440 feet) seem possible. Pliny gives the perimeter of the monument as 440 feet, and is supported in this by Hyginus and

[1] The immense quantity of green ragstone used in the construction of the castle of Budrum must have formed the core of the basement; probably many of the facing blocks exist in the same place.

Vibius Sequester. Pliny's statement, however, seems to imply that the given perimeter (*circumitus*) was that of the pteron, a very inaccessible place for such a measurement. Only the socle could be measured from the outside, and with the requirements of this part the perimeter of 440 feet perfectly agrees. Below the socle were a few steps, the lowest of which must have approximately fitted the foundation cutting, 108×127 English feet, equivalent to 111.32×130.91 Greek feet; this allows 5 feet all around the socle for steps and base mouldings, making the lowest step $109\frac{1}{2} \times 130\frac{1}{2}$ Greek feet, with a perimeter of 480 Greek feet.

On the analogy of the Nereid Monument and of the Lion Tomb, an imposing entrance does not seem to have been desired. The natural desire to create a centre of interest on the line of the main axis, at the head of the flights of steps which led up from terrace to terrace, could have been as well fulfilled by the concentration at this point of a mass of sculpture. At the same time the occurrence of an important opening directly below a column is avoided, though probably the violation of this modern canon would not have caused the Greek architect the least concern. A small entrance, however, at one side of the central mass of sculpture, could be well fitted in the socle at the base of the battering walls of the basement; and, because of the colossal scale, the design is more likely to have been symmetrical, with two such entrances.[1]

Of the internal structure almost nothing has been discovered. The only authority is Guichard, and his reliability has often been disputed. The narrative runs as follows: the Knights had excavated beside the marble steps (see p. 153), and then *au bout de quatre ou cinq iours, apres auoir faict vne grande descouuerte, par vne apresdisnee ils virent vne ouuerture comme*

[1] Only one other monument on a large scale and with an odd number of columns on the front shows a similar close relation between the columns and the wall containing the entrances. This is the Olympieum at Agrigentum, which has seven engaged columns in the east wall, and two symmetrical entrances (Koldewey and Puchstein, *Die griechischen Tempel*, pp. 156–157) which are small indeed in comparison with the colossal façade. The resemblance between the plan of the Olympieum and that of the naos of the Mausoleum (PLATE VI), each with a central aisle inaccessible from the outside except through two small doors symmetrically placed and leading into the side aisles, is obvious.

pour entrer dans vne caue; ils prirent de la chandelle, & deualerent dedans, où ils treuuerent vne belle grande sale carree, embellie tout au tour de colonnes de marbre, auec leurs bases, chapiteaux, architraues, frises, & cornices grauees & taillees en demybosse; l'entredeux des colonnes estoit reuestu de lastres, listeaux ou plattes bandes de marbres de diuerses couleurs ornees de moulures & sculptures conformes au reste de l'oeuure, & rapportés propermēt sur le fonds blāc de la muraille, où ne se voyoit qu' histoires taillees, & toutes battailles à demyrelief. . . . Outre ceste sale ils treuuerent apres vne porte fort basse, qui conduisoit à vne autre, comme antichambre, ou il y auoit vn sepulcre auec son vase & son tymbre de marbre blanc, fort beau & reluisant à merueilles, lequel, pour n'auoir pas eu assez de temps, ils ne descouurirent, la retraicte estant desia sonnee.

Some disregard this description altogether, saying that it is the result of De la Tourette's heated imagination. C. Torr (*Cl. R.* I, p. 79) decides that it is merely a new version of the Arabic story of the forcing of the great pyramid at Gizeh by Khalif al-Mamun; like the Knights in the Mausoleum, the Arabs hewed an entrance in the side of the pyramid and entered a chamber, beyond which was another chamber with a vase and an inscription; the only improvements in Guichard's narrative would be the addition of the sculptures in relief, "suggested by those in the castle," and the incursion of the corsairs.

Many statements in the narrative itself, however, show that it had some foundation. If we accept literally all that Guichard describes, the tomb chamber was more ornate than any known Greek interior; yet all the facts may have been true. The larger chamber, probably a chapel, was square, surrounded by columns (pilasters and piers?), while the spaces between them were filled with slabs of variegated marble. This part of the story is extremely probable; the thin marble slabs evidently formed a facing for the walls of coarse green ragstone, of which the basement was constructed; and Mausolus was noted for facing walls of inferior material, such as brick, with thin slabs of Proconnesian marble.[1] The order of the pilasters and piers was not Doric, because bases are mentioned; perhaps we have the capital of one of them in the example drawn

[1] Vitruvius, II, 8, 10, and Pliny, XXXVI, 6.

by Donaldson,[1] which is similar in type to those from Miletus and Priene. From one corner of this room a low doorway led to the tomb chamber, containing the sarcophagus. The ornaments of gold foil which, as Guichard says, were thrown from the sarcophagus by the pirates and were found scattered on the ground the next day, point to a Greek custom not known in the sixteenth century, and therefore not likely to have been invented by De la Tourette. Such ornaments, contemporary with the Mausoleum, are found in tombs in the Crimea.

The doorway connecting the chapel and the tomb chamber was too small for the passage of sarcophagi; for use at the funerals of Mausolus and his successors, a separate approach was constructed at the west end. This was not intended to be permanently exposed to view but was covered with earth which was removed only on the occasion of a royal funeral. Then appeared a flight of twelve steps, 29 feet wide, leading down in the solid rock to a level $12\frac{1}{2}$ feet below the terrace.[2] Advancing to the substructure of the Mausoleum, one found a subterranean passage $4\frac{1}{2}$ feet wide leading under the basement wall. This passage was closed by a single great stone, $4\frac{1}{2} \times 4\frac{1}{2}$ feet and 7 feet high, with bronze dowels fixed with lead in its bottom surface, fitting corresponding sockets in the marble pavement below. For each burial this stone would have to be pried up and moved out on rollers into the open; afterwards it would be rolled back and dropped into place. This stone and its fittings were found *in situ;* it is centred exactly under the axis of the third intercolumniation from the north (a confirmation of the size of the intercolumniation already derived); and it corresponds in position to the two small doors by which I suppose the east front of the basement to have been entered, and to the door connecting the tomb chamber and the chapel. Under the great stone, pieces of marble floor slabs remained and showed that the thickness of the pavement was 9 dactyls. Under them a water

[1] *Antiq. of Athens*, Suppl. Vol. 1830, pl. IV, and *A.J.A.* XII, 1908, pl. I.

[2] This flight must not be confused with a narrower flight of fifteen steps, coming at an angle into the south side; these are much earlier in date, belonging to a cemetery, into which, in the fifth century, the old quarry had been converted; and they were cut off from the foundation cutting of the Mausoleum by a retaining wall.

drain marks the axis of the passage; it runs back to a point directly beneath the west wall of the chapel, as I have located it. This point, then, marks the termination of the passage, which was the lowest paved room in the Mausoleum; on either side the ragstone filling rises in places to a height of about 10 feet. The only possible conclusion is that the floor of the tomb chamber was at a higher level, which I have assumed to be $2\frac{1}{2}$ feet below the terrace. The passage was a subway leading into the tomb chamber; a sarcophagus, brought in on rollers, was lifted to its final level by a temporary rigging with pulleys and windlass.

The position of this tomb chamber was directly behind (west of) the chapel, as shown by the special burial entrance. On either side of the chapel are vacant spaces which I have imagined were occupied by a series of alcoves for the reception of the sarcophagi of the successors of Mausolus, just as the contemporary kings of Sidon gathered their sarcophagi into a common burial place. Recesses of this form may be seen in the fifth-century Charmyleion at Pyli on Cos,[1] and I have made them similar in position to those which radiate from the foot of the "bee-hive" in the Lion Tomb at Cnidus.[2]

The basement entrances and vestibule being at the east front, there, too, we should expect to find staircases leading to the naos and peristyle above. I have shown a winding staircase in each of the front corners, landing after two revolutions at a mezzanine floor, where they unite in a grand staircase, two intercolumniations in width, leading up to the interior of the naos, between two rows of interior columns, which are necessary for the support of the pyramid. The east wall of the naos contains doors leading from the aisles out into the peristyle, while the entire central part is open, filled by a bronze grille, reversing the arrangement in the Temple of Athena Nike at Athens. Thus, as one mounts the staircase, the great volume of sunlight falling from behind strikes the statues of Mausolus and Artemisia, as they face the spectator from the opposite end of the chamber.

The canon of the Seven Wonders was formed in an age which

[1] Newton, *Hist. of Discoveries*, I, pl. 82. [2] *Ibid.* I, pl. 62.

had ideals very different from those of the great period of Greek art. It is from the point of view of the classical period that we are apt to judge all Greek architecture, but it is with reference to the later ideals that we can best appreciate the reasons for the fame of the Mausoleum. The Hellenistic age was characterized, on the one hand, by a rather pedantic learning, a love of cataloguing and research, the formation of theories, and the like, and on the other hand, by a desire for new forms in all the arts, which resulted in a loss of the dignity and coldness of the fifth century. These conditions wrought a great change in artistic ideals. Through the influence of the one, rules were formulated by theorists, published in treatises, and taught in schools; the other brought about a desire for the marvellous. A happy combination of the two made the reputation of any work of architecture, and in the case of the Mausoleum there were still other grounds for its fame. It was marvellous, since it was the first example on a large scale of the daring combination of three elements, the tumulus, the high basement, and the Greek temple. It appealed to the theorists because of the care with which its proportions were adjusted; for Pythius was one of the earliest of a long series of architectural theorists whose names Vitruvius (VII, praef.) has preserved. These reasons alone were sufficient, in the Hellenistic age, to make the Mausoleum famous as a work of architecture, though in beauty it was probably surpassed by many of the less marvellous fifth-century structures which were not placed among the wonders of the world. In addition, the Mausoleum had a third claim, richness of sculptured decoration; in part colossal, as the quadriga and the equestrian statues; in part remarkable for technical perfection, as the statue of Mausolus; while it would be hard to find anywhere in Greek art a work that at once so well expresses passion, sentimentality, and sensuality, qualities especially favored after the fourth century, as the Amazon frieze of the order.

The influence of the Mausoleum on architecture was, except in the proportions of the order, not very great till Roman times. Yet a few works of the Greek period clearly reflect the type. The monument of Lysicrates at Athens is reminiscent of the Mausoleum insomuch as it has the high basement supporting

the columns. A tomb at Dugga, in Tunis,[1] with a high basement raised on four steps, supporting a pseudo-peripteral chamber with two engaged Ionic columns between pilasters on each side, and a low pyramid at the top, was probably due to foreign influence brought in by Carthaginian commerce in the third century; it has inscriptions in Punic and Libyan. The "Tomb of Theron" at Acragas, in Sicily, seems to have been erected before the Roman domination, but in a late period of Greek art; on a high basis is a chamber with an Ionic column at each angle and, with a Doric triglyph entablature, surmounted by a pyramid. Another example is the Souma (tower), near Constantine in Algeria,[2] a purely Greek structure, probably built by Greek artists working for Micipsa (148–118 B.C.). It is raised on a high and plain basis, with steps ascending to a podium, on which is another square basement and another podium, supporting a small Doric pteron with a pediment on each of the four sides.

Of the Roman examples, very few are in any sense copies. A tomb at Mylasa[3] has the square basement, supporting a peristyle of elliptical columns between angle piers, crowned by an entablature without a cornice; a pyramid of four steps rose abruptly above the frieze; there is no naos, and the intercolumniations were filled with thin slabs forming screen walls. A tomb at Ooràn,[4] near Denizli in Phrygia, has the same features, except that the pteron is formed by six heavy piers. Many tombs show traces of the influence of the Mausoleum in the pyramid placed above columns; such is a monument at Celenderis,[5] in Cilicia, where each side is formed by an arch framed by two pilasters with their entablature, and the whole crowned by a true pyramid with smooth sides. The Monument of the Julii at St. Remy in Provence is a reminiscence of this type, and several very distant reflections occur in Tripolis. Finally, in the fourth and fifth centuries of the Christian era, the form became an established type in Syria; of especial importance is the "Tomb of Diogenes" at Hâss.[6]

[1] *Trans. Amer. Ethnol. Soc.* 1845, I, p. 477, pls. 9, 10.
[2] E. Falkener, *Mus. Class. Ant.* I, p. 173 and pl.
[3] *Antiquities of Ionia*, II, pp. 25–26, pls. 24–30.
[4] E. Falkener, *l.c.* I, p. 174 and pl. [5] E. Falkener, *l.c.* I, p. 188 and pl.
[6] Butler, *Architecture and Other Arts*, pp. 160–163.

The term "Mausoleum" was, in the Roman period, applied as a generic name to such tombs as those of Caecilia Metella, Augustus, and Hadrian. They still preserve the three divisions, the great square basement, the main story (here circular), and the tumulus of earth; but they are Mausolea only in name.

Aside from monumental remains, the influence of the Mausoleum may also be traced in literature. Contemporary with the structure itself was a treatise by its architects, mentioned by Vitruvius (VII, praef. 12). It has been said[1] that the most comprehensive extant description, that of Pliny, was compiled from this treatise; that such a theory would account for the accuracy of the statement in details, as well as for the confused arrangement and the gaps in the whole. But Pliny does not seem to have used this work; it is not mentioned in his list of authorities, the architects are not named, and the dimensions given, except the easily obtainable ground measurement of 63 feet, are all round numbers, such as would be given by a guide; many of them are pure guesses. It seems more probable that Furtwängler[2] is right in attributing the description to C. Licinius Mucianus, who published observations made in the East, recording especially marvellous stories rather than dry facts.

The treatise of Pythius and Satyrus is mentioned by Vitruvius as one of his authorities, but it is uncertain what he can have drawn from it. The two passages definitely ascribed to Pythius[3] are certainly taken from his treatise on the temple at Priene.[4] Again, among the statements for which the sources are not given, one, and one only, seems due to Pythius; this is the rule[5] for the height of the epistyle, which again is applicable only to Priene. We may say, therefore, that we have absolutely no remains of the treatise by Satyrus and Pythius. The only other known description of any length was in a treatise on the Seven Wonders by Philon of Byzantium; the chapter on the Mausoleum happens to be the only one lost. We have, however, several notices of more or less value,

[1] Newton, *Hist. of Discoveries*, II, p. 194.

[2] 'Plinius und seine Quellen,' *Jahrb. f. kl. Philol. Spplbd.* IX, 1877, p. 54.

[3] Vitruvius, IV, 3, 1, and I, 1, 12.

[4] Cf. Vitruvius, VII, praef. 12.

[5] Vitruvius, III, 5, 8.

written while the monument still remained intact, and ranging from the second century B.C. to the final destruction by the Knights of Rhodes in 1522; some of these I have used in the previous discussion; all are here mentioned in their chronological order.

Antipater Sidonius: — in *Anthology*, ed. Jacobs, II, p. 20.
Cicero: — mention in a reference to Artemisia, *Tusc. Disp.* III, 31.
Propertius: — III, ii, 19.
Vitruvius: — notice in a description of Halicarnassus, II, 8, 10.
Vitruvius: — discussion of architects and sculptors of the Mausoleum, VII, praef. 12.
Hyginus: — a notice with dimensions, *Fab.* 223.
Strabo: — mention in a description of Halicarnassus, XIV, p. 656.
Valerius Maximus: — mention in an anecdote of Artemisia, IV, 6, ext. 1.
Pomponius Mela: — mention in a description of Halicarnassus, I, 16.
Pliny: — the most valuable extant description, *H.N.* XXXVI, 30–31.
Martial: — *Spect.* 1.
Aulus Gellius: — mention in a description of the funeral ceremonies of Mausolus, X, 18.
Pausanias: — VIII, 16, 4.
Lucian: — a rather long but unimportant passage, Νεκρικοὶ Διάλογοι, XXIV.
Maximus Tyrius: — Διαλέξεις, XXXV, 2.
Diogenes Laertius: — II, 3, 10.
Vibius Sequester: — a notice with dimensions (*de Septem Spectaculis*).
St. Jerome: — *Adv. Jovinianum*, I.
Cassiodorus: — *Var.* VII, 15.
Gregory of Nazianus: — in *Anthology*, VIII, 184.
Nicetas: — mention in a list of the Seven Wonders.
Constantine VII: — Περὶ τῶν Θεμάτων, I, 14.
Abbreviator of Strabo: — about the tenth century.
Eudocia: — Ἰωνιά (Villoison; *Anecd. Graec.* 1781, I, p. 286).
Georgius Cedrenus: — Σύνοψις ἱστοριῶν, 81.
Eustathius: — last mention as still existing intact, *Comment.* Ιλ. Ψ. 256.
Jacobus Fontanus: — the beginning of the destruction of the Mausoleum, *De Bello Rhodio*, Rome, 1524, Lib. II, fol. 11.
Coriolano Cepio: — notice of ruins, *De Petri Mocenici Gestis*, Venice, 1477, p. 378.
Marcantonio Sabellico: — notice derived from Cepio, *Historia rerum Venetarum*, Venice (1485), 1718, Lib. XXIX.
Claude Guichard: — story of the final destruction in 1522, *Funerailles et diverses manieres d'ensevelir des Rommains, Grecs*, etc., Lyons, 1581, pp. 379 ff.
Lorenzo d'Anania: — mention of ruins, *Fabrica del Mondo*, 1575, sect. 2.

Geronimo Marulli: — mention of ruins of the Mausoleum as if under water, probably referring to the mole in the harbor, showing that even the site had been forgotten, *Vite de' Gran Maestri di S. Giovanni Gierosolimitano*, Naples, 1636, p. 389.

The earliest attempt to restore the design of the Mausoleum dates from the year before the Knights finished its destruction in their preparation for the last stand against the Turks, in 1522. From that date to the present we may divide the restorations into three great groups: —

I. Restorations made before any material remains were known. These were as a rule purely imaginary, and even fantastic; yet others were the serious attempts of editors of Pliny and Vitruvius to reconcile the vagaries of the texts. Doric, Ionic, or Corinthian orders were employed impartially. The prevalent idea that the peristyle was 63 feet by less, resulting in a slender tower-like pyramid, and that it was the precinct wall which had the perimeter of 411 (for 440) feet, was shaken only by the adverse opinions of Donaldson and Leake at the very end of the period.

1. Cesare Cesariano, edition of Vitruvius, Como, 1521, fol. XLI.
2. Gualtherus Rivius, translation of Vitruvius, Nuremberg, 1548, fol. LXXXIII.
3. Paduan (?) medals of the sixteenth century, pretended coins of
4. Mausolus, shown by Guichard, *op. cit.* pp. 376, 378.
5. Claude Guichard, *op. cit.* pp. 374–375.
6. Jacques d'Alechamps, edition of Pliny, Geneva, 1631. It was he who sent De la Tourette's story to Guichard.
7. Leo Allaci, *Diatriba de Mausoli sepulcro*, in his edition of Philon Byzantinus, Rome, 1640.
8. Gijsbert Kuiper, *Disquisitio de nummo Mausoleum Artemisiae exhibente*, in his *Apotheosis Homeri*, Amsterdam, 1683, pp. 236–243.
9. Jean Hardouin, edition of Pliny, Paris, 1685.
10. Domenico d'Aulisio, *De Mausolei architectura*, Naples, 1694. Reprinted in Sallengre, *Novus Thesaurus Antiquitatum Romanarum*, The Hague, 1716–1724, III, pp. 913–920.
11. J. B. Fischer d'Erlach, *Entwurff einer historischen Architectur*, Vienna, 1721, pl. 6.
12. Giacinto Corrado, painting of Artemisia lamenting Mausolus, in Florence.
13. Sir Christopher Wren, *Parentalia*, London, 1750, p. 367.
14. Nicholas Hawksmoor, Tower of St. George's, Bloomsbury, London.
15. Comte de Caylus, *Mém. de l'Acad. des Inscr.* XXVI, 1753–1754, pp. 321–334, pls. I–IV.

16. Comte de Choiseul-Gouffier, *Voyage pittoresque*, Paris, 1782, I, pp. 158–161, pl. I.
17. L. Poinsinet de Sivry, translation of Pliny, Paris, 1771.
18. A. Rode, translation of Vitruvius, Leipzig, 1796.
19. H. C. Genelli, vignette for Rode's edition of Vitruvius, Berlin, 1800.
20. Abate Marquez, in Guattani, *Memorie Enciclopediche Romane*, Rome, 1811, V, pp. 129–139.
21. A. Hirt, *Geschichte der Baukunst bei den Alten*, Berlin, 1823, II, p. 70, pl. 10.
22. L. Canina, *Architettura Greca*, Rome, 1834, III, pp. 103–108, pl. 158.
23. F. Weinbrenner, as quoted by K. B. Stark, *Vorträge und Aufsätze*, Leipzig, 1880, p. 471.
24. A. C. Quatremère de Quincy, *Receuil de Dissertations Archéologiques*, Paris, 1836, pp. 109–141.
25. C. R. Cockerell, restoration of 1844, as quoted by Leake (see below), p. 45, note 16.
26. T. L. Donaldson, as quoted by Leake, *ibid.*
27. W. M. Leake, *Trans. Royal Soc. Lit.*, 2d series, II, 1847, pp. 44–49.

II. Restorations made after the discovery of the frieze of the order. The order was now known to be Ionic (or Corinthian, as Fergusson has it); and the scale of the frieze blocks showed that it was to the order that Pliny's height of 25 cubits referred.

28. C. R. Cockerell, *Class. Mus.* V, 1847, pp. 193–196.
29. W. W. Lloyd, *Arch. Zeit.* 1848, p. 81 and pl. 12.
30. C. Texier, *Asie Mineure*, Paris, 1849, III, pp. 121–132.
31. J. Fergusson, *Principles of Beauty in Art*, London, 1849, pp. 320–323.
32. E. Falkener, *Mus. of Class. Antiq.* I, pp. 157–189.
33. C. R. Cockerell, restoration of 1856, Goodchild, *Halicarnassian Marbles*, pl. 2.
34. C. R. Cockerell, fourth restoration, drawing by F. Cockerell in British Museum. *Catal. Sculpt.* II, pl. XIV; *Builder*, Aug. 29, 1896.

III. Restorations made after the excavation of the site. The general form of the monument now became certain. Lieutenant Smith's restoration, made on the site itself, was elaborated by Pullan and Fergusson, and finally by Adler, whose results, with the exception of his dimensions, have been most convincing.

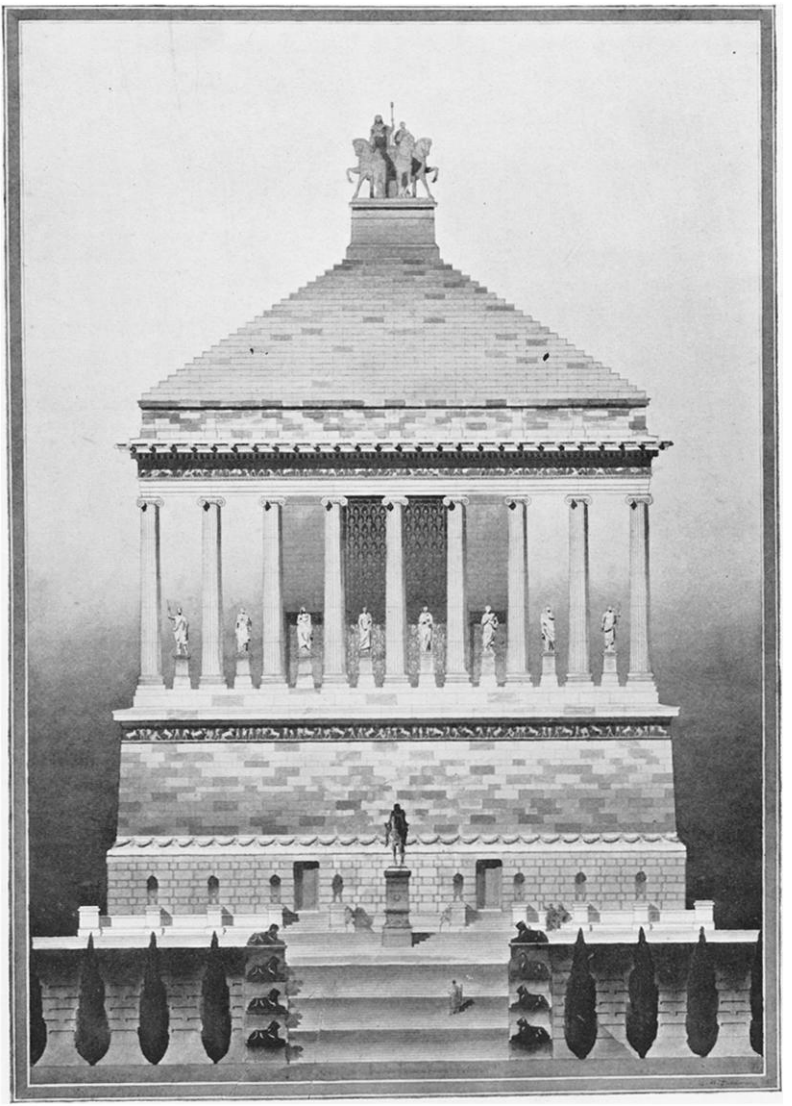
35. R. M. Smith, *Papers respecting the Excavations at Budrum*, London, 1858. Reprinted by W. K. Dickson, *Life of Maj.-Gen. Sir R. M. Smith*, pp. 353–367.
36. R. P. Pullan, in Newton's *History of Discoveries at Halicarnassus, Cnidus, and Branchidae*, London, 1862, I, pls. 16–31; II, pp. 157–212.

37. J. Fergusson, *The Mausoleum at Halicarnassus Restored*, London, 1862.
38. C. Petersen, *Das Maussoleum, oder das Grabmal des Königs Maussolos von Karien*, Hamburg, 1867.
39. S. L. Bernier, Envoi de l'Academie de Rome, 1878. *Les Envois de Rome: I, Architecture grecque*, Paris (Pourchet), 1897, pls. 45–48.
40. J. E. Goodchild, *Halicarnassian Marbles in the British Museum*, London, 1888.
41. A. Trendelenburg, *Arch. Anzeiger*, 1890, p. 105.
42. E. Oldfield, *Archaeologia*, LIV, 1895, pp. 273 ff. Revised in *Archaeologia*, LV, 1896, pp. 343 ff.
43. T. Arnold, *Builder's Journal*, Jan., 1896.
44. J. J. Stevenson, *Builder*, Aug. 29, 1896.
45. F. Adler, *Das Mausoleum zu Halikarnass*, Berlin, 1900.
46. J. Six, *J.H.S.* XXV, 1905, pp. 1–13.

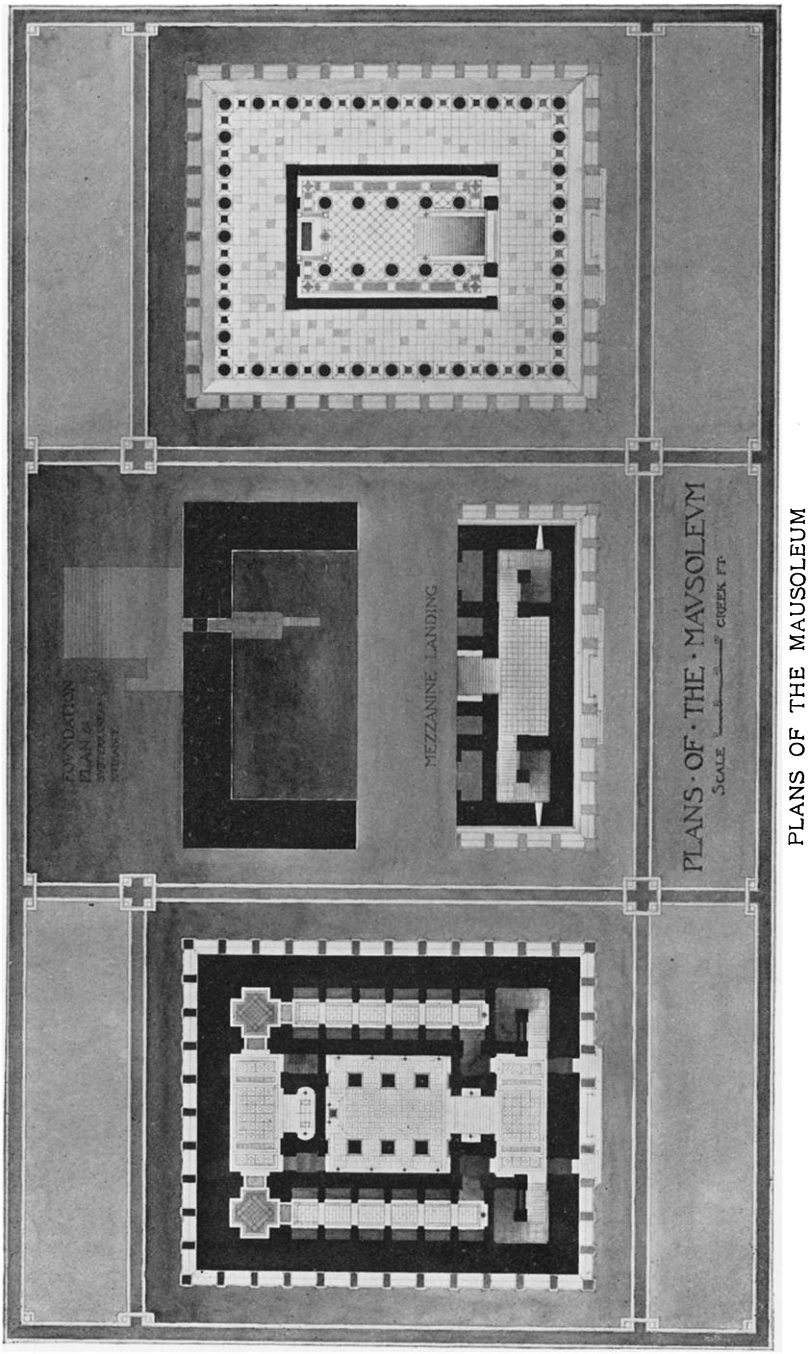
Of these, Goodchild and Stevenson retained the 63-foot peristyle which antedates the excavations; Bernier disregarded both Pliny and the actual remains in making his plan square; all three have the high form of pyramid. Arnold despaired of filling the height given by Pliny as 140 feet, and so followed an unaccepted reading in a single manuscript, *C. pedum altitudine;* Trendelenburg attained a similar result by omitting the basement. Oldfield, following Guichard's narrative too literally, inserted a "pyramid," as he calls it, below the basement, and gained a curious Greek cross plan; and Petersen applied Guichard's system of interior decoration to the exterior of his basement. As for the pediments, employed by Canina because he found them on the Paduan forgeries (which he believed genuine), and retained by Oldfield and Six, they are impractical in a building of such a form as the Mausoleum. They are well suited to their places in Oldfield's restoration, but this is a restoration very improbable in itself. Only by following the road pursued by Smith, Pullan, Fergusson, and Adler, can we attain a true knowledge of the design. My aim has been to add to their results, if possible, by ascertaining the exact dimensions of the members and elements of the design—(1) by measuring those that remain in the Greek feet and dactyls according to which they were originally laid out, so that (2), with the dimensions thus reduced to their simplest terms, so to speak, the relations between the various members become self-evident; by showing (3) that Pythius followed certain definite proportions and ratios in their design;

and (4) that many of these proportions were already determined for him by the fashion of the period, a fashion which was really the expression of the constant striving for the best, an ideal seen from a gradually shifting standpoint. The problem must be studied from the point of view of an architect of the middle of the fourth century.

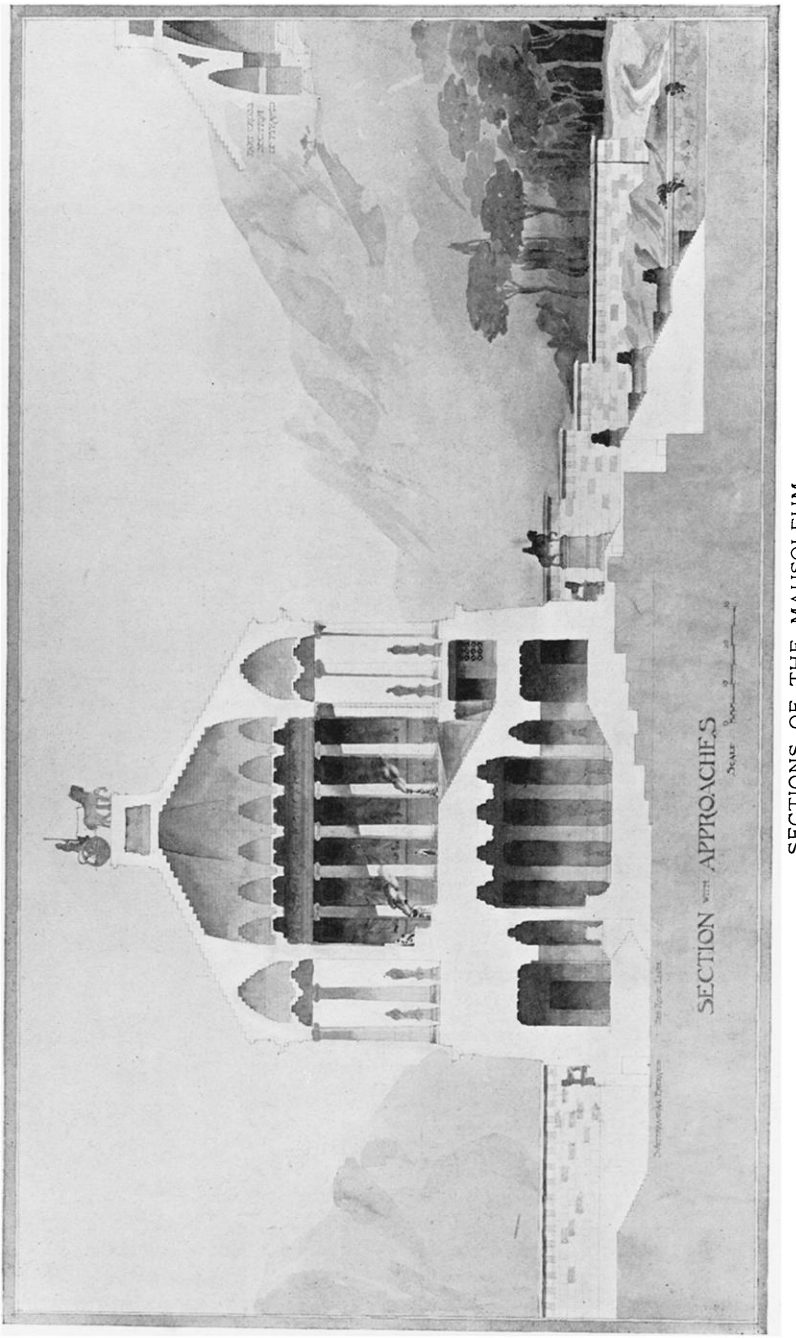
WILLIAM B. DINSMOOR.



EAST FRONT OF THE MAUSOLEUM



PLANS OF THE MAUSOLEUM



SECTIONS OF THE MAUSOLEUM